SCHOLARLY PUBLICATIONS
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Journal Name: Results in Engineering **IF: 9.4**

Title: GREEN-LM: Carbon-aware neural language models with energy-adaptive layers and sparse knowledge distillation

Author: Godavarthi D.; Geethika N.; Pavan Sai M.; Karthikeya C.; Nandan Mohanty S.; Bhusan Dash B.

Details: Volume-32, December 2026

Abstract: BERT and other transformer-based models have established them-selves as the leading solution for natural language processing tasks, but their operation requires excessive computational resources and energy which creates problems for both their performance and their ecological impact. The research presents GREEN-LM, a transformer framework which utilizes real-time carbon awareness and energy-efficient technology to achieve energy-efficient performance through the implementation of its three core components which include sparse knowledge distillation and energy-adaptive inference and dynamic model rout-ing. The proposed system implements a teacher-student model that uses a full-capacity BERT model as its teacher while the student model performs efficient inference through its compression mechanism. The advanced sparse distillation method uses adaptive Top-K selection together with entropy-based filtering and importance-weighted learning to achieve better knowledge transfer results. The student model uses early-exit classifiers to enable adaptive computation through prediction confidence-based termination of inference at intermediate layers. The framework uses real-time carbon intensity signals from external APIs such as WattTime and ElectricityMap to create environmental awareness. The system uses these signals to change its inference process by modifying the confidence threshold which determines both early exits and model routing decisions, thus allowing the system to reach its objectives of precise prediction and reduced en-vironmental impact. The experimental evaluation of GREEN-LM showed that it achieved near-teacher-level accuracy at 99.90 percent with only 0.10 percent performance drop and delivered 3.49 times faster inference than the base system. The framework processes 97.3 percent of inputs through its lightweight student model which reduces its dependence on the computationally intensive teacher model. The proposed approach provides a method to estimate potential carbon savings through its capability to decrease energy use during times of high carbon emissions. The results show that three essential components of model compres-sion real-time carbon-aware decision-making and adaptive inference must work together for successful NLP system development.

URL: https://www.sciencedirect.com/science/article/pii/S2590123026032445?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: **IEEE Open Journal of the Communications Society** **IF: 6.2**

Title: QoE-Driven Multimodal Multi-Agent NDN-Enabled Blockchain Framework for Adaptive 6G Communication Networks

Author: Yadav A.S.; Pawar V.; Mazid A.; Barik R.K.; Balusamy B.; Kumar G.

Details: 3rd July, 2026

Abstract: Sixth-generation (6G) communication networks are expected to support immersive, intelligent, and latency-sensitive applications that require scalable, secure, and adaptive communication infrastructures. However, conventional IP-based blockchain systems suffer from significant communication overhead, redundant data dissemination, synchronization delays, and limited scalability, which hinder their applicability in dynamic 6G environments. To address these challenges, this paper proposes a Quality of Experience (QoE)- driven multimodal multi-agent Named Data Networking (NDN)-enabled blockchain framework for adaptive 6G communication systems. The proposed architecture integrates content-centric networking, in-network caching, multicast dissemination, and blockchain-based decentralized trust management to improve communication efficiency and scalability. Furthermore, the framework incorporates multimodal data fusion, cooperative multi-agent coordination, QoE-aware adaptive learning, and federated edge intelligence to enable intelligent and user-centric communication optimization. A distributed peer-to-peer overlay and optimized NDN-based communication protocols are designed to support efficient blockchain synchronization while maintaining interoperability with existing Ethereum infrastructures. The proposed framework is evaluated using ndnSIM, NS-3, and a modified Go-Ethereum client across multiple distributed network topologies. Experimental results demonstrate significant reductions in end-to-end latency, redundant traffic transmission, and synchronization overhead, while improving caching efficiency, traffic utilization, and adaptive content dissemination performance compared with conventional IP-based blockchain communication systems. The results validate the effectiveness of integrating NDN, blockchain, multimodal intelligence, and distributed adaptive coordination to establish a scalable, secure, and QoE-aware foundation for future intelligent 6G communication ecosystems.

URL: https://ieeexplore.ieee.org/document/11594918

SCHOLARLY PUBLICATIONS
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Journal Name: Scientific Reports **IF: 4.9**

Title: Multimodal deep feature fusion with transformer for brain tumor classification from magnetic resonance imaging

Author: Pajany M.; Boopalan K.; Rajesh R.; JaiSingh W.; Dash B.B.; Rout S.K.; Kumar P.P.

Details: Volume 16, Issue 1, December 2026

Abstract: Brain tumors (BTs) arise due to abnormal cell growth, which has a high mortality rate globally. Millions of lives can be saved through the timely identification of BT. Precise identification and segmentation of BTs are essential to enhance the precision of analysis and the efficiency of therapeutic strategies. Magnetic resonance imaging (MRI) is a broadly utilized analytical tool. Furthermore, deep learning (DL) has recently shown efficiency in addressing several computer vision tasks. Several DL-driven methods are implemented for BT segmentation and attained impressive outcomes. This study presents a Multimodal Deep Feature Fusion Framework for Automated Brain Tumor Detection and Segmentation (MDFF-ABTDS) model. This objective is to develop a multimodal DL that integrates feature fusion and transformer networks for the precise detection and segmentation of BTs from medical images. Initially, image pre-processing is performed using Contrast Limited Adaptive Histogram Equalization (CLAHE) and image normalization. Feature extraction is carried out through fusion models such as CapsNet, ResNet-50, and AlexNet. These extracted features are then passed to a bi-directional convolutional long short-term memory combined with transformer (TBConvL-Net) models to classify tumors and non-tumors effectively. Finally, the tumor is classified to identify its location using the nnUNet model for a precise segmentation process. A series of experimental analyses of the MDFF-ABTDS method portrayed a superior accuracy value of 98.91% over existing models under the BT MRI dataset.

URL: https://www.nature.com/articles/s41598-026-44957-9

SCHOLARLY PUBLICATIONS
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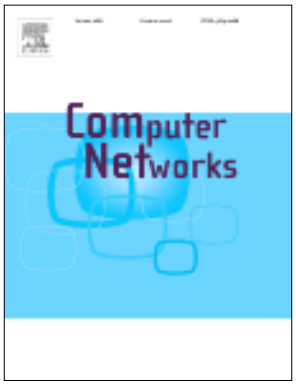
Journal Name: Computer Networks **IF: 4.7**

Title: PaMTS: A priority-aware multi-objective task scheduling framework for fog computing environment

Author: Apat H.K.; Sahoo B.; Goswami V.

Details: Volume-289, October 2026

Abstract: Fog computing has emerged as a promising distributed computing paradigm supports ultra-low latency and real-time processing for various Internet of Things (IoT) applications. The rapid proliferation of these IoT workloads characterized by heterogeneous task size, and various urgency levels. The conventional scheduling techniques struggle to consistently satisfy stringent service-level objectives. To address these challenges, a priority-aware multi-objective task scheduling (PaMTS) framework is proposed as an effective approach to allocate the tasks according to their urgency levels, such as latency-sensitive or latency-tolerant. The proposed framework ensures that critical tasks are executed with minimal delay while non-critical tasks are scheduled opportunistically to enhance overall efficiency. However finding the optimal scheduling of tasks in distributed system is a well known NP complete problem. An Integer Linear Programming (ILP) based multi-objective task scheduling problem is formulated. To get the sub optimal solution of the problem we employed a population based meta-heuristic algorithm named as Teaching-Learning-Based Optimization (TLBO) algorithm, which efficiently schedule the set of tasks to the available fog nodes under conflicting performance goals. Further an M/M/C+M queuing framework is employed in the proposed model to capture system dynamics, enabling rigorous evaluation of key performance indicators such as response time, abandonment probability, throughput, and resource utilization. Experimental results show that the proposed PaMTS reduces latency by up to 30%, improves throughput by 20%, lowers energy consumption by 24%, and enhances resource utilization by 14% compared to state-of-the-art metaheuristic approaches. A comprehensive sensitivity analysis further validates the robustness of the model under varying workload intensities, patience rates, and deadline constraints.



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